

CSUN Crystalline Silicon PV Module Products Installation Manual (IEC Version)

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(Version: May 2013)

1 General Information

This manual contains information regarding the installation and safe handling of the photovoltaic module (hereafter is referred to as “module”) produced by China Sunergy (Nanjing) Co., Ltd., CEEG (Nanjing) Renewable Energy Co., Ltd. and CEEG (Shanghai) Solar Science Technology Co., Ltd.(hereinafter referred to as “CSUN”).

Installers must read and understand the manual before installation. Any questions, please contact the sales or customer service personnel of CSUN for further explanations. The installer should conform to all safety precautions in the manual and local laws & regulations when installing module; before installing a solar photovoltaic system, installers should become familiar with the mechanical and electrical requirement for such a system. CSUN has the right to refuse to compensate for the product damage due to construction or design defects of the solar photovoltaic system.

Keep this manual in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

2 Disclaimer of Liability

Customers shall strictly abide by the requirements of this manual when installing the modules of CSUN. If the conditions or methods of the installation, handling, use and maintenance of the customer are beyond the range specified in this manual and cause damage, CSUN does not assume responsibility for any loss, damage or expense thus caused.

No responsibility is assumed by CSUN for any infringement of patent right or other rights of third parties, which may result from the customer’s use of the CSUN’s modules. No patent license or patent rights is granted to customer, express or implied, due to its use of CSUN’s modules.

The information in this manual is based on CSUN’s best knowledge and experience and is believed to be reliable; but such information including product specification (without limitations) and suggestions do not specifications, or product information without prior notice.

3 Safety Precaution

3.1 General Safety

- Installing solar photovoltaic systems require specialized skills and knowledge. Installation should be performed only by qualified persons. Installers should assume the risk of all injuries that might occur during installation, such as electric shock.
- A single module may produce the direct current (hereafter is referred to as DC) voltage of above 30V in direct sunlight and it is extremely dangerous to contact it.. Do not touch or lean on an operating module.
- Photovoltaic modules are designed for outdoor use. Modules may be mounted on ground, rooftops, vehicles or boats. Proper design of support structures is the responsibility of the system designers or installers. Mounting holes or clamp range and numbers suggested in this manual shall be used.
- Do not disconnect under load or apply paint or adhesive to module surface.
- Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules. Do not expose the backside of modules directly to sunlight for a long time.
- Keep all electrical contacts clean and dry. Do not change the wiring of the bypass diodes. Do not disassemble the modules or remove any attached nameplates or components from the modules.
- When installing the modules, it is should abide by the relevant local laws and regulations. It is need to obtain the required certificates in advance when necessary, such as the building permit.

3.2 Handling Safety

- Store modules in a dry and ventilated environment. Keep children and unauthorized persons away from the modules while transporting and installing them. Improper transportation and placing may lead to glass breakage or power loss of the modules, resulting in the loss of the use value of modules.
- Handle modules with care. Lift and put down modules gently. It is forbidden to pull the junction box or cables when carry or lift the modules. Carry a module by its edges with two or more persons.
- Do not place excessive loads on the module or twist the module frame. Do not stack the modules for transportation.
- Pay special attention not to collide, scratch or press the module backside when transporting and installing the modules.
- To avoid module damage, do not stand or step on the module. Do not drop or place objects on the modules (such as tools). Do not set the module down on any hard surface, which maybe cause the cells broken.

- Inappropriate transport and installation may damage the module. Control the vehicle speed when the road condition is relatively poor.

3.3 Installation Safety

- Abide by the safety regulations for all other components used in the system, including wiring and cables, connectors, solar charge controller, inverters, storage batteries, etc. Use suitable equipment, connectors, wiring and mounting system for a PV system. It is better to use the same type modules in one system.
- Do not install or handle the modules when they are wet or during strong wind. Keep the junction box cover closed. .
- Modules are constructed with tempered glass, which shall be handled with care. Improper operations may cause the tempered glass breakage. If the front glass is broken or if the backsheet is burned-out, contact with any module surface or the aluminum frame can produce electrical shock, particularly when the module is wet. Broken or damaged modules must be disposed properly.
- When exposed to direct sunlight, one individual solar module may generate DC voltages greater than 30 volts. it is extremely dangerous to contact it.
- Completely cover the module with an opaque material during installation to keep electricity from being generated. Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic devices while installing or troubleshooting photovoltaic systems. Use insulated tools that are approved for working on electrical installations and always keep them dry.
- The triangle hole punched on the backside frame of the module is the drain hole which cannot be blocked.
- The maximum system voltage indicated in the nameplate is 1000 V. Attention: During the system Installation, the maximum open circuit voltage in series cannot exceed the maximum system voltage.
- During modules interconnection, guarantee to fix the connecting cables to the mounting system, so as to restrict the amplitude of swing of the slack part of the wire.
- Conform to the allowable minimum bending radius of the wire.
- Always protect the wire with conduit where animals or children can touch it.
- Please use the connector which is specially designed for photovoltaic system and assemble it with the tools recommended or specified by the manufacturer. In case that the connector applicable to the solar photovoltaic system is required, please contact the local supplier.

- Make sure that the polarity is correct when connecting the module with inverter, storage battery or combiner box to avoid the damage of bypass diodes in the modules due to incorrect polarity.

4 Product Identification and Current Sorting

(A) Product Identification

Each module has labels providing the following information:

- Nameplate: Describes the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, all are measured at STC; weight, dimension, maximum system voltage and the fuse rating are all shown on the nameplate.
- Barcode: Each module has a unique serial number. It contains the relevant production information of the module.

(B) Current Sorting

Each module has a specific label on either side of long aluminum frame (as shown in FIG 1) with the following information:

- Modules are sorted by I_{mpp} (current at maximum power point). Different color labels with distinct alphabetical letters ($I_1, I_2, I_3, I_4, \dots$) are used to represent the I_{mpp} class.
- CSUN recommends connecting the same I_{mpp} class modules in series in order to avoid or minimize power loss due to mismatch.

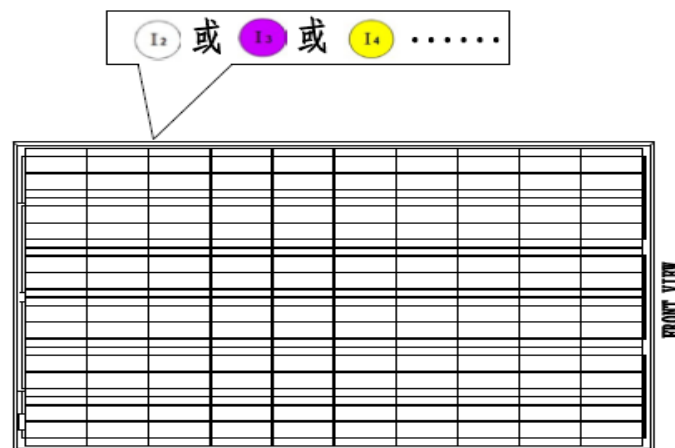


FIG 1 Label of module current

5 Electrical Property Parameters of Modules

- Under Standard Test Conditions (1,000W/m², AM 1.5 and 25° C (77°F)) the electric characteristics, including I_{sc}, V_{oc} and P_{max}, the deviation between the measured value and nominal value is within +10%.
- Under normal outdoor conditions, a module is likely to produce different current and voltage than the values measured under STC in the specification of CSUN module products. Therefore, when determining the parameters related to the power output of the module, for example, nominal voltage, conductor capacity, fuse capacity and controller capacity, etc., refer to the values of short-circuit current and open circuit voltage of the modules, and take 125% of those values during design and installation.
- The maximum nominal voltage for all module series is 1000V according to IEC standards.

6 Installation Instructions

6.1 Installation Environment

- In most applications, PV modules should be installed in a location where they will receive maximum sunlight throughout the year.
- The module shall be installed in the place where the sunshine is adequate. The module should not be shaded at any time during its operation. During installation, the module surface shall not be partly shaded by clothes, tools, packaging materials, etc.
- Install the module in well ventilated place and guarantee that adequate natural air heat dissipation channels are provided at the back and sides of the module to ensure that the heat generated during operation is radiated in time.
- Never place the module in locations where flammable gases may be easily generated or collected. CSUN suggests installing the module in dry areas where the climate is moderate. In case of the special installation environments such as the seaside, farm, high humidity environment and sandstorm environment, contact the local dealer for professional support and confirmation.
- Modules connected in series should be at the same tilt and azimuth. Differing orientations or angles may cause a loss of power output due to differing amount of sunlight exposure for each module. Typically, the optimal tilt for a module is roughly the same as the installation location.

6.2 Selection of Mounting Structure

- Always conform to the instruction manual and safety rules attached to the mounting system.

- The entire PV system consisting of modules must be able to withstand anticipated mechanical pressure which comes from local wind force, snow, etc.
- Drilling holes on the surface of module glass may void the warranty.
- Drilling additional mounting holes on module frames may void the warranty.
- The mounting system structure must be made of durable, corrosion-resistant and UV-resistant materials.
- Forces generated during thermal expansion and contraction of the mounting system structure shall not influence the performance and use of the module.
- The bearing surface of the mounting structure must be smooth without any twist or deformation, and the connected support frames shall be at the same height.

6.3 Three kinds of Mounting

(A) Roof Mounting

- It is necessary to provide a special support frame for the roof mounting. When installing a module on a roof or building, ensure that it is securely fastened and cannot fall or be damaged as a result of strong winds or heavy snows. During roof mounting, check the building codes being used to ensure that the building and its structure where the module is installed have adequate bearing capacity. The roof needs to be penetrated during module installation and fixing shall be sealed to avoid rainwater seepage.
- To be suitable for operation, reduce steam condensation and facilitate the ventilation & heat dissipation of the module during tile installation, the module shall be parallel to the wall or roof surface of the building, and the clearance between module and surface of the wall or roof shall be at least 115mm to prevent wiring damage and to allow air circulation, ventilation and heat dissipation behind the module. During stacking type installation, the module shall be installed on the fire-resistant roof. The modules Fire Resistance Rated Class of the modules is Class C, and the modules are suitable for mounting on an above Class A roof. Do not install modules on a roof or building during strong winds.
- For the roof system installed in the area that ever experienced relatively heavy snowfall or snow cover, the customer shall reinforce the mounting system at the lower frame of the module, in order to prevent the lower frame from being pressed and damaged by the falling snow, and avoid the module damage due to melt snow freezing in daytime. CSUN suggests to selecting the support reinforcing mechanism shown in Figure 2.

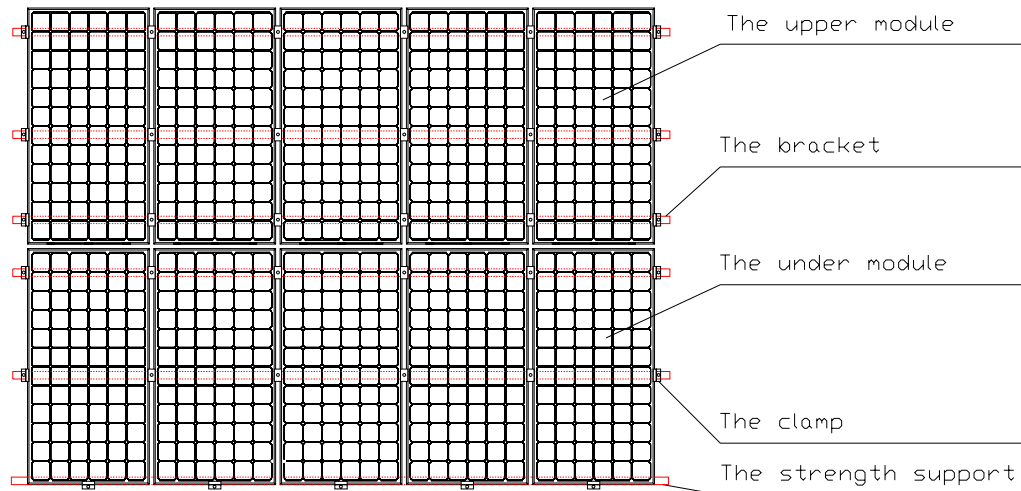


FIG 2 Schematic diagram of reinforcement mounting of module

(B) Pole Mounting

- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated wind power of the local area. The support rod must be constructed on a solid foundation.

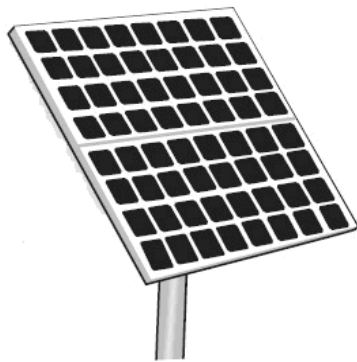


FIG 3 Pole mounting



FIG 4 Ground mounting

(C) Ground Mounting

- Select the height of the mounting system to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience heavy snowfalls. The module shall be installed on the mounting system with appropriate height instead of being directly laid on the ground. In addition, assure the lowest portion of the module is placed high enough (≥ 900 mm) so that it is not shaded by plants or trees, and the module is not damaged by sand and stone driven by wind, or the module surface is not shaded by the mud

splashed by rain water.

6.4 Two Installation Methods

- Modules can be installed on the frame using mounting holes or clamps. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.
- The modules have been evaluated by UL for a maximum positive or negative design loading of 2,400 Pa and for standard installation, the four symmetry holes close to the inner side on module frames or pressure clamp shall be used to fix the module to the support frame. CUSN modules can sustain 2400 Pa wind pressure and 5400 Pa snow load. System designer and installer are responsible for load calculations.
- The mounting system and other various goods & materials required (such as screw) shall be made of durable, corrosion-resistant and UV-resistant materials.

(1) Screw fitting:

- Using corrosion-proof screws (M8) in the existing installing holes in the module frame.
- Do not attempt to drill holes in the glass surface or additional mounting.
- The frame of each module has 4 mounting holes used to secure.
- The module frame must be attached to the mounting system using M8 stainless steel hardware together with spring washers and flat washers in four places symmetrical on the module.

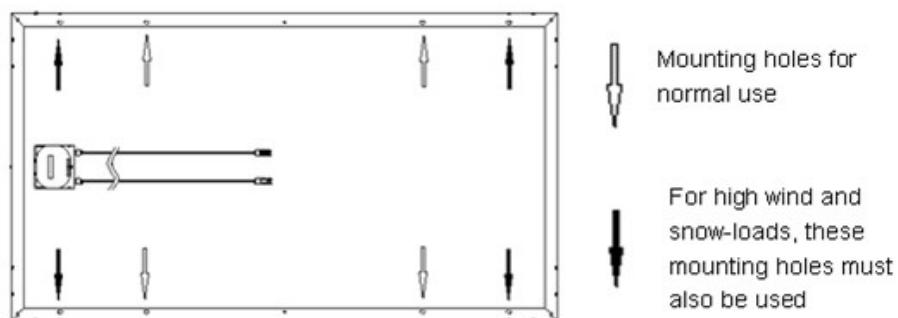


FIG 5 Mounting holes

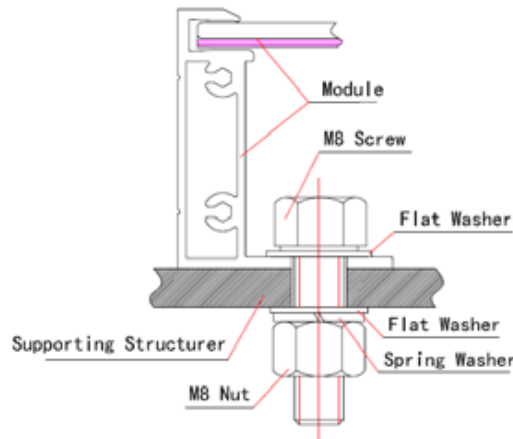


FIG6 Screw fitting method

(2) Clamp fitting:

- Using suitable module clamps on the side of the module frame to mount the modules we suggest installer use the long side of the module frame. When using clamps to clamp the module frame, the area of side A of module frame clamped by each clamp shall be no less than 800 mm^2 .
 - The modules should be fixed to the structure using M8 stainless steel hardware together with corrosion-proof clamps on the long side. The clamps must be mounted at the position of the mounting hole or CSUN suggested clamp range and numbers.
 - Note that long sides should always be mounted in a symmetric position respect to the center.
- Recommended torque should be 8 Newton-meters. Please see details in FIG 7.
- If the customer has special clamping and installation schemes which are not included in this manual, please contact the local dealer for professional support.

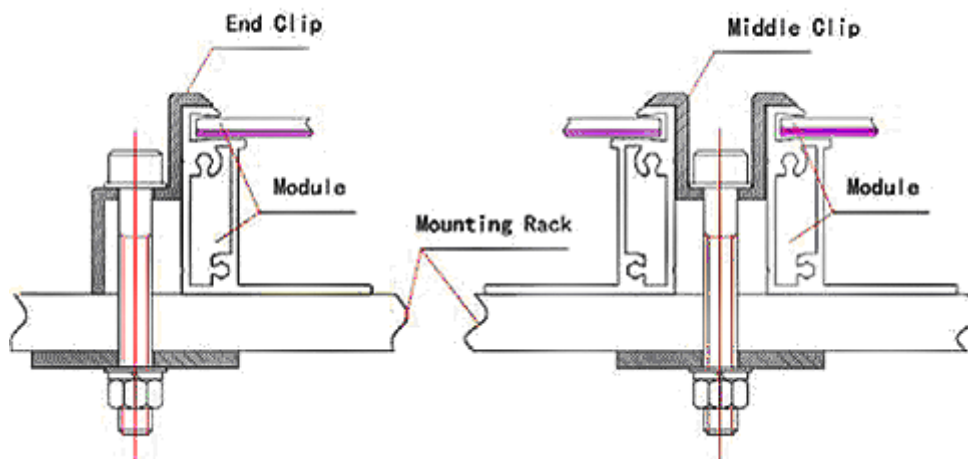


FIG 7-a Clamping mounting method

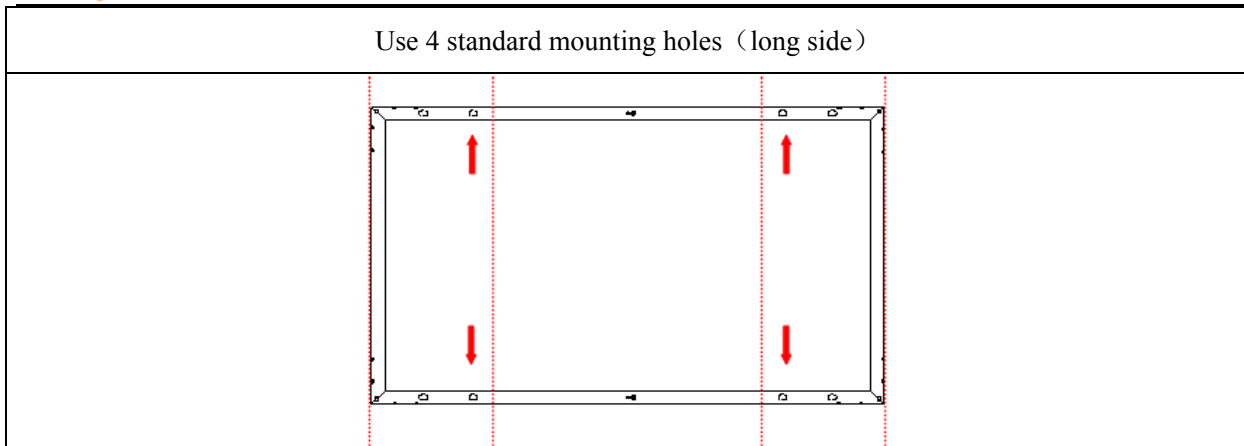


FIG 7-b Long side installation

- If heavy snowfall, relatively large snow load or large wind pressure exist in the module installation area, CSUN suggests the customer to selecting the 5400Pa strengthening installation scheme to clamp and fix the module (as shown in FIG 8) to improve the bearing capacity of the module for static snow load at front side and dynamic wind pressure at back side, and enhance the system capacity.

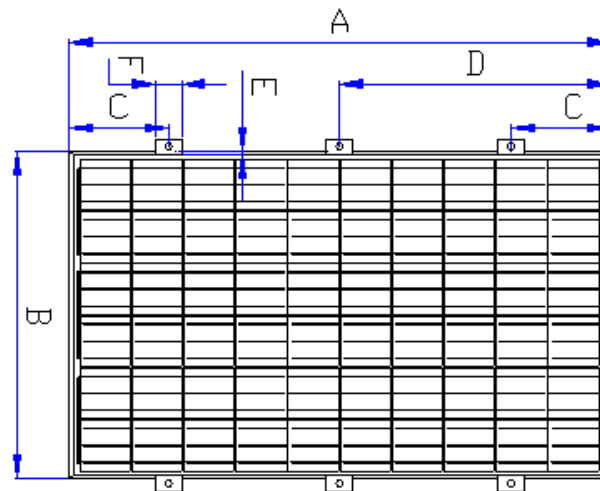


FIG 8

Module type	Mechanical Loading) /Pa	A/mm	B/mm	C/mm	D/mm	E/mm	F/mm
CSUN200-72M	2400	1580	808	350±50	/	10	>80
	5400	1580	808	200±50	790±50	10	>80
CSUN250-60M/P	2400	1640	990	350±50	/	10	>80
	5400	1640	990	200±50	820±50	10	>80
CSUN300-72M/P	2400	1956	990	400±50	/	10	>80
	5400	1956	990	250±50	978±50	10	>80

Note:

A: Length of this type of module;

B: Width of this type of module;

C: The distance of clamp center1 from the edge of this type of module;

D: The distance of clamp center 2 from the edge of this type of module;

E: Clamped width of the module frame by the clamp of this type of module;

F: Clamped length of the module frame by the clamp of this type of module;

*** NOTES:**

CSUN's limited warranty will be void in cases where improper clamps or installation methods deviating from this manual are used. When installing inter-modules or end type clamps, take measures so as:

A. Not to bend the module frame.

B. The clips must only fix the modules by the contact with the frame. Do not allow contact between clip and glass.

C. Not to damage the surface of the frame.

D. When mounting, be sure that the module's drain holes are not blocked.

For matters concerning installation not mentioned in this section, contact the local dealer for professional support.

7 Electrical Installation

7.1 General With Regard to Electrical Installation

- Try to use the modules with the same configuration in the same photovoltaic system. If the modules are connected in series, the total voltage is the sum of voltages of all the modules, and the maximum number of the series modules $(N) = V_{\max}(\text{System}) / [V_{oc}(\text{at STC})]$.
- If the system requires the installation of high current, several photovoltaic modules can be connected in parallel, and total current is the sum of current of all the modules. The maximum number of the parallel module strings $(N) = I_{\max}(\text{fuse rating}) / I_{sc}$.
- When connecting modules, make sure that the connectors of the same series module shall come from the same manufacturer or totally be compatible with each others, and the same requirements shall go to the connection terminals of module end and system end, for the connectors of the different manufacturers may not be compatible with each others, which easily leads to mismatch risk.
- Never perform pretreatment to modules including connector, junction box and cable with lubricating oil or cleaning agent made of alkane materials during installation.
- The cross section area and connector capacity of the cable selected must satisfy the maximum short-circuit current of the system (It is recommended that the cross section area of the cable used for the single module is

4mm², and the rated current of the connector is greater than 10A. Please note that the upper temperature limit of the cable and connector is 85°C and 105°C respectively).

- When installing the module, place the end with the junction box up and try to avoid the rain.
- Do not carry out installation in rainy weather for humidity will void the insulation protection, thus causing safety accidents.

7.2 Grounding

- All module frames and mounting racks must be properly grounded. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent, connector for this wire.
- If the mount system is made of metal, the surface of the structure must be electroplated and have excellent conductivity.
- Proper grounding is achieved by connecting the module frame(s) and structural members contiguously using a suitable grounding conductor.
- The grounding conductor must then make a connection to earth using a suitable earth ground electrode. Recommend to use the ground wire accessories (lugs) connected to ground Cable. Welding ground cable to the jack of lugs, and then with the M4 screws inserted into the wiring nose ring and the grounding hole of the module frame, fastening with nuts. Star spring washers should be used to prevent the screws from loosening and lead to poor grounding.
- If the module is used in high-temperature and high-humidity environment, CSUN suggests the customer provide the inverter which allows negative grounding and contains isolation transformer (as shown in FIG9).

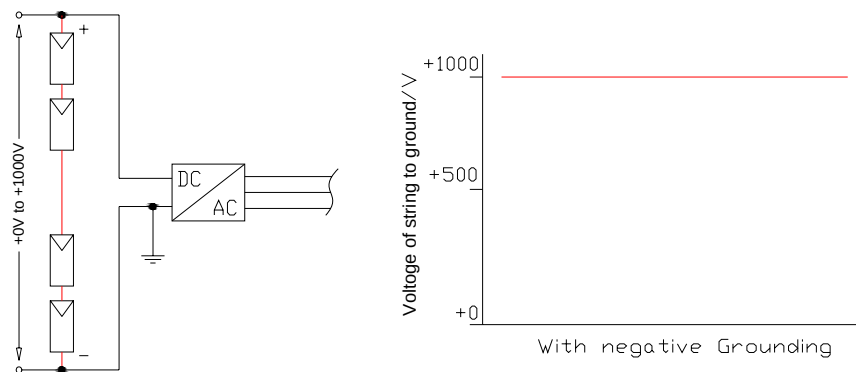


FIG 9 Schematic diagram for grounding potential of the inverter

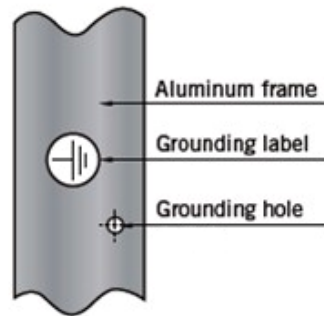


FIG 10-a Grounding hole

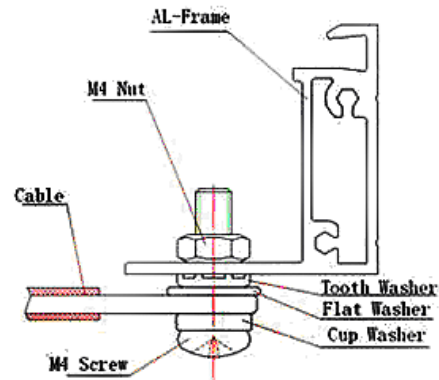


FIG 10-b Grounding method

8 Maintenance and Care

- Clean the glass surface on a regular basis.
- In general, use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.
- Avoid pressing part of the module hard during cleaning. Pressing hard on part of the module may cause glass deformation, cell damage and service life reduction of the module. Remove the snow covered on the module in time to avoid the module damage caused by long-term accumulation of snow cover and freezing of melted snow.
- Examine the PV module(s) for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check electrical leakage to ground. Check fixing screws and mounting brackets, adjust and tighten as necessary.
- Never clean the electrical connectors including cable, junction box and connector with the cleaning agents that contain organic matters such as alkane.
- If any problem arises, have it investigated by a competent specialist.

* If the maintenance measures are not included in this manual, please contact the local dealer for professional support.